

Figure 1

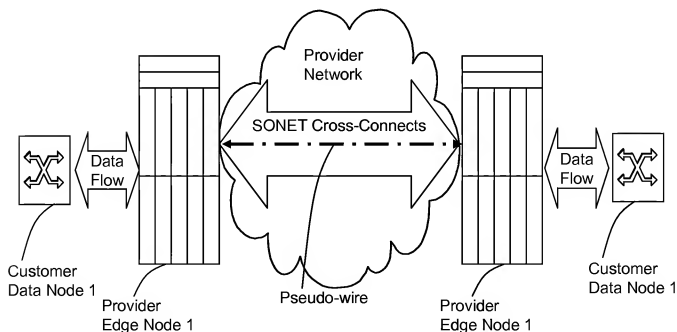


Figure 2

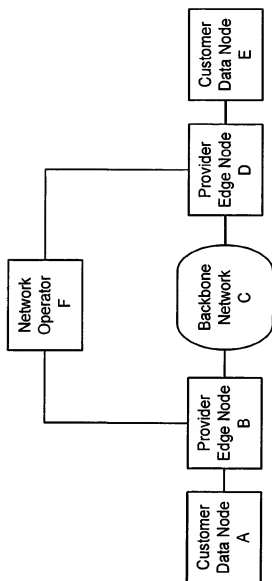


Figure 3

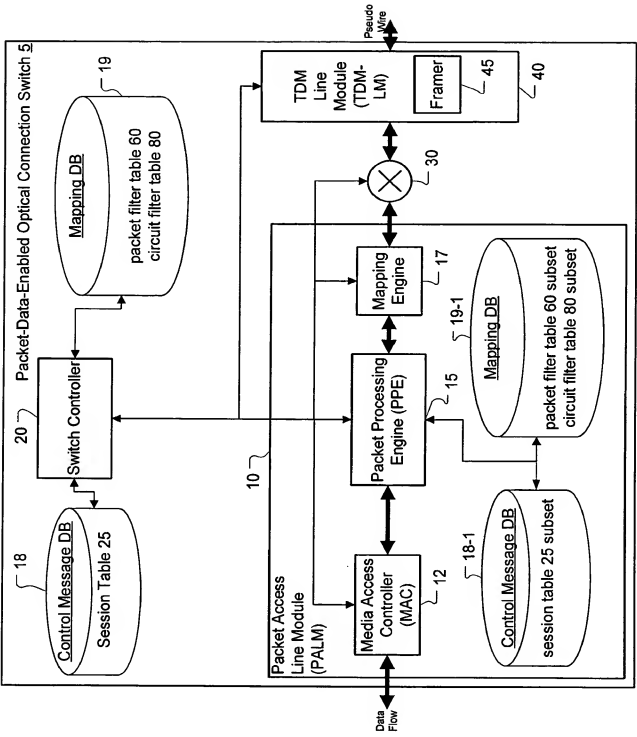


Figure 4

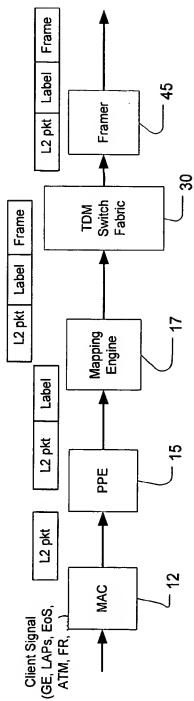


Figure 5

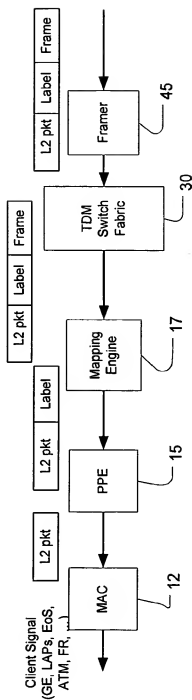
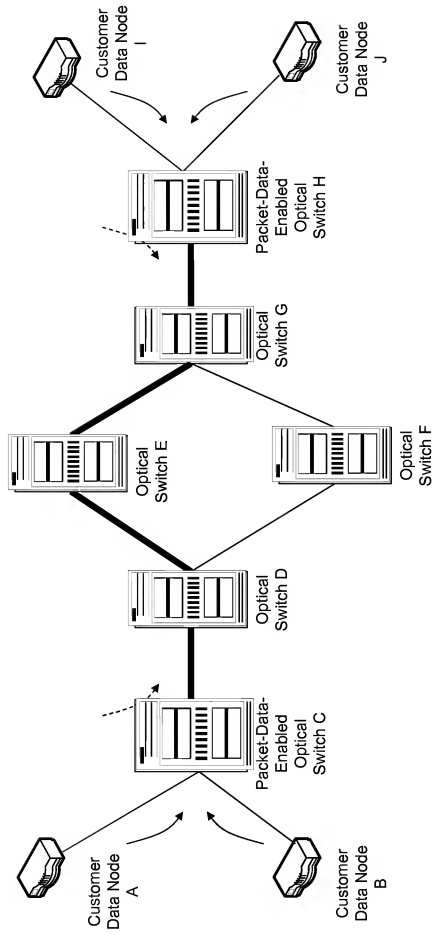


Figure 6



An optical connection between two data-enabled optical switches going over multiple network nodes

A data flow originating from a customer data node

Control message flow originated from a data-enabled optical switch

Key

Figure 7

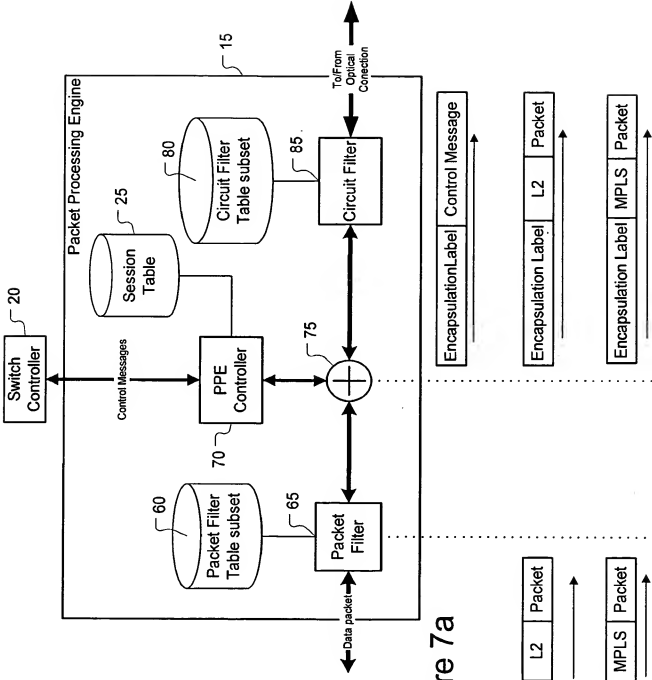


Figure 7a

PACKET FILTER TABLE				
PACKET FILTER (DATA INTERFACE, LABEL)	OUTGOING OPTICAL CONNECTION	ENCAPSULATION LABEL	FILTER PRIORITY	GUARANTEED QOS
PACKET FILTER-1 (PORT 1, ETHERNET VLAN 100)	SONET VCG NUMBER 3	MPLS LABEL 10000	3	X
PACKET FILTER-2 (PORT 5, ATM VC/VP12/45)	SONET VCG NUMBER 3	MPLS LABEL 20000	3	Y
PACKET FILTER-3 (PORT 2, FR DLCI 900)	OPTICAL INTERFACE 1	MPLS LABEL 500	3	Z
PACKET FILTER-4 (PORT 1, MPLS LABEL 10000)	SONET VCG NUMBER 5	MPLS LABEL 10001	1	S

Figure 7b

CIRCUIT FILTER TABLE			
CIRCUIT FILTER (OPTICAL CONNECTION, LABEL)	OUTGOING DATA INTERFACE	OVERWRITTEN LABEL	GUARANTEED QOS
CIRCUIT FILTER-1 (SONET VCG 3, LABEL 20000)	DATA PORT 1	ETHERNET VLAN 200	X
CIRCUIT FILTER-2 (SONET VCG 3, LABEL 20001)	DATA PORT 2	ATM VC/VP1 23556	Y
CIRCUIT FILTER-3 (OPTICAL INTERFACE 1, LABEL 300)	DATA PORT 1	NONE	Z
CIRCUIT FILTER-4 (SONET VCG 5, LABEL 12000)	DATA PORT 23	FRAME RELAY DLCI 200	S
CIRCUIT FILTER-5 (SONET VCG 3, LABEL 3)	HOST INTERFACE	NONE	T

Figure 7c

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SESSION TABLE			
SESSION (CONTROL MESSAGE ID)	OUTGOING OPTICAL CONNECTION	ENCAPSULATION LABEL	GUARANTEED QOS
SESSION 1 (TCP SRC PORT 1345)	SONET VCG NUMBER 3	MPLS LABEL 3	X
SESSION 2 (TCP SRC PORT 3456)	SONET VCG NUMBER 3	MPLS LABEL 3	Y
SESSION 3 (UDP PORT 1998)	OPTICAL INTERFACE 1	MPLS LABEL 10000	Z

Figure 7d

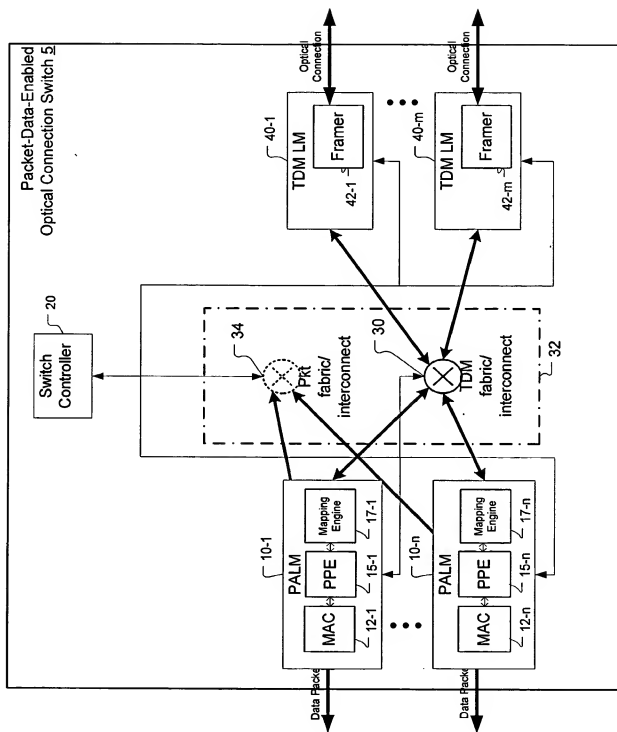


Figure 8

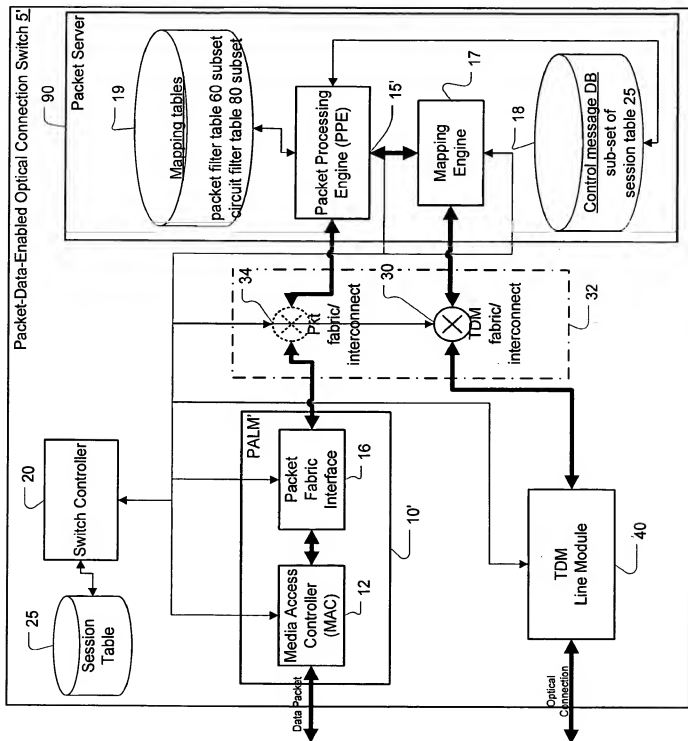


Figure 9

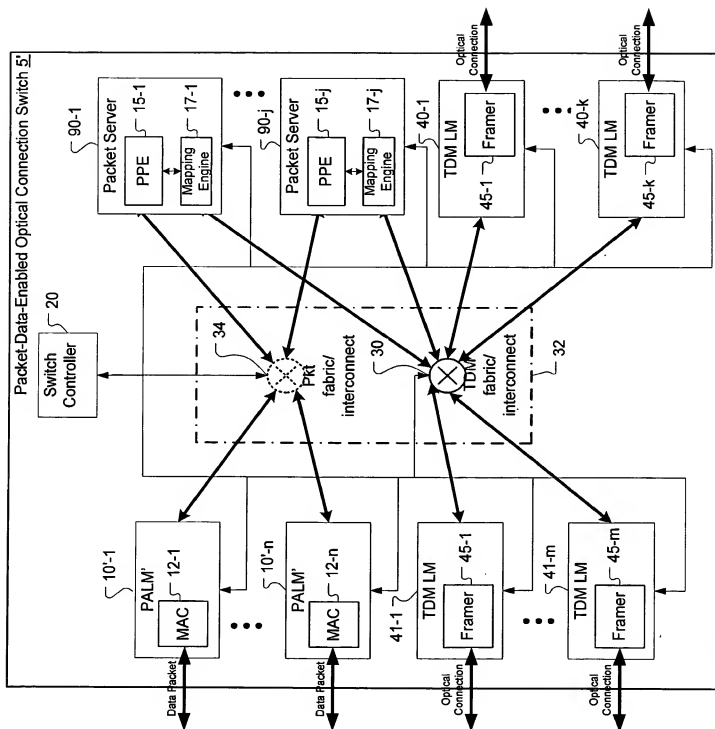


Figure 10

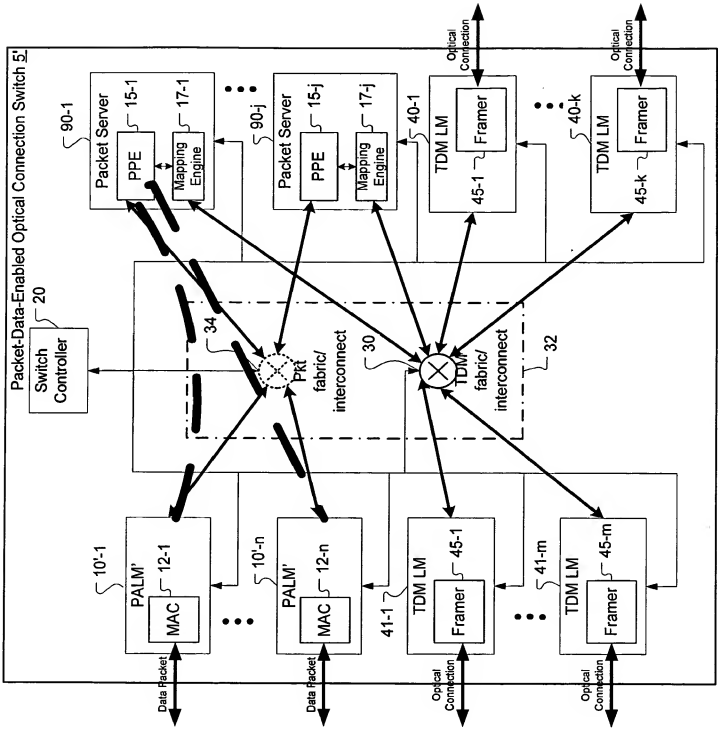


Figure 11

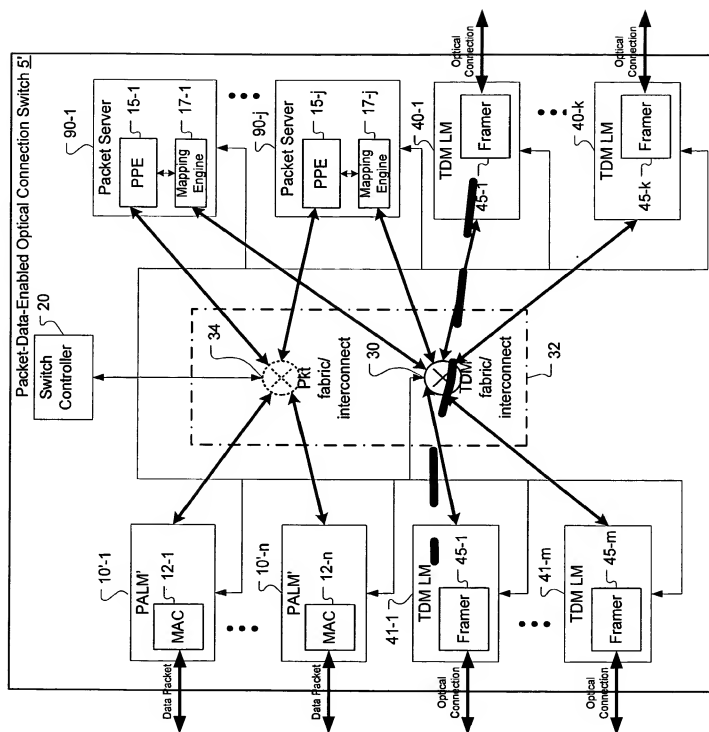


Figure 12

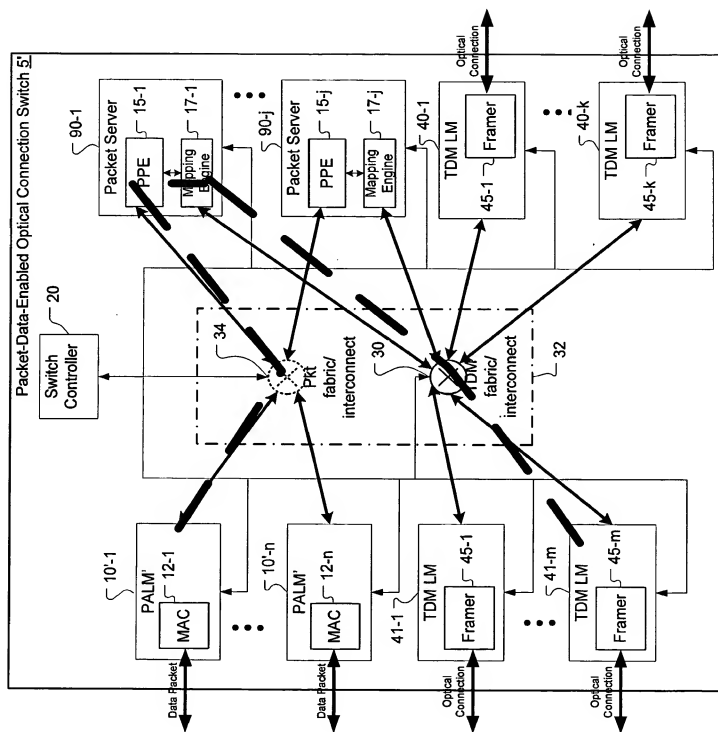


Figure 13

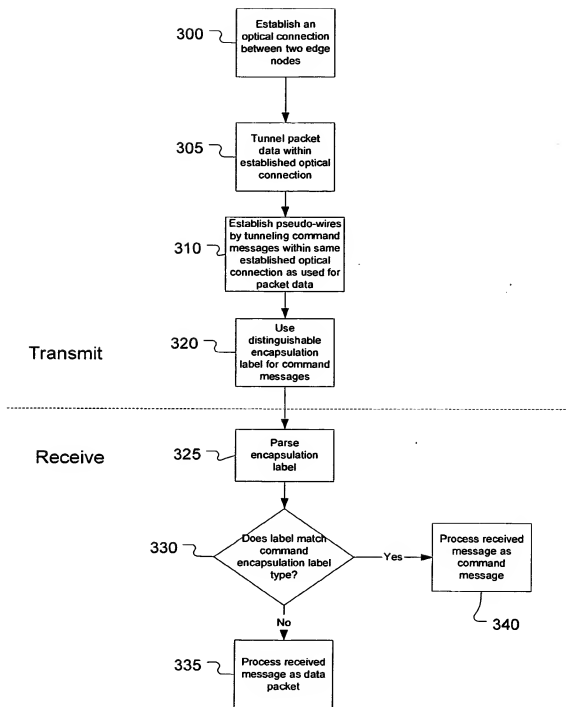


Figure 14

Figure 15a

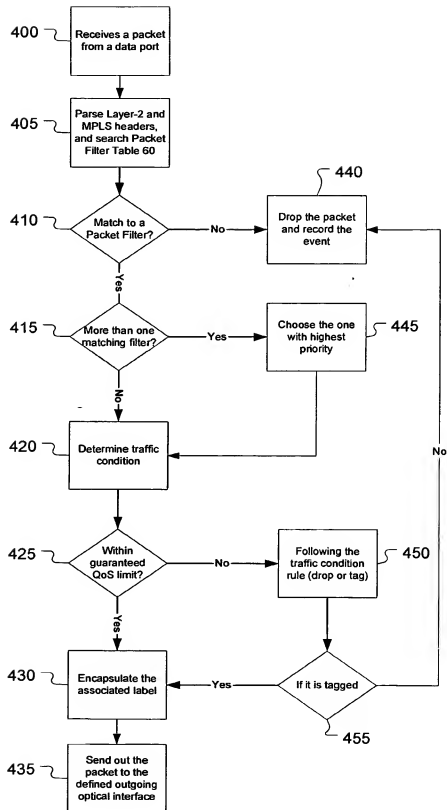


Figure 15b

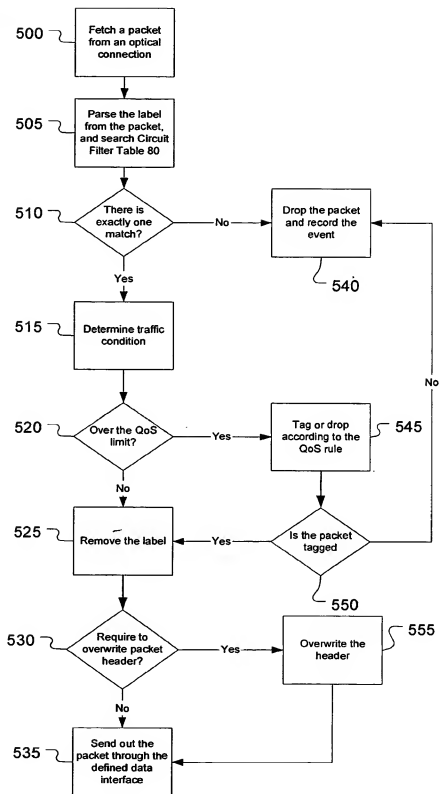
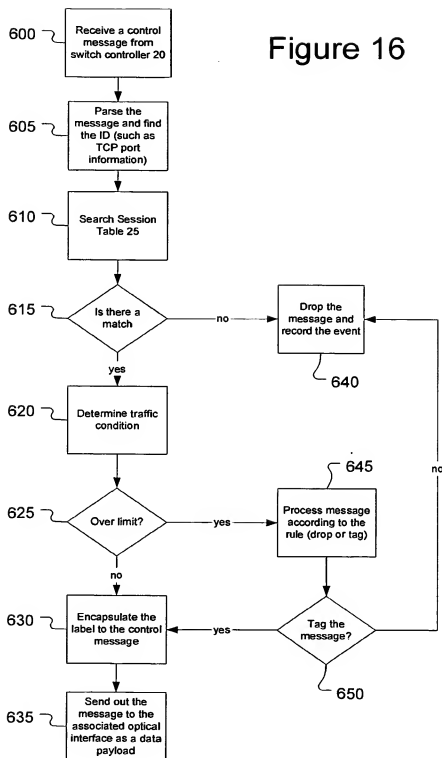


Figure 16



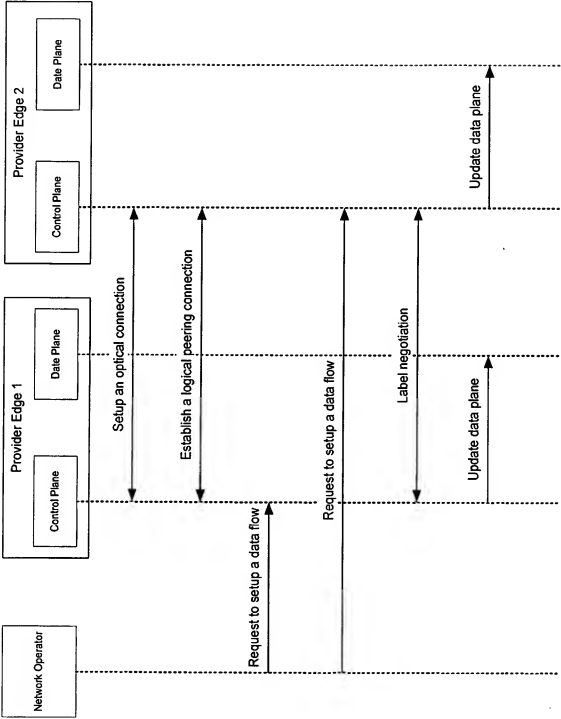


Figure 17

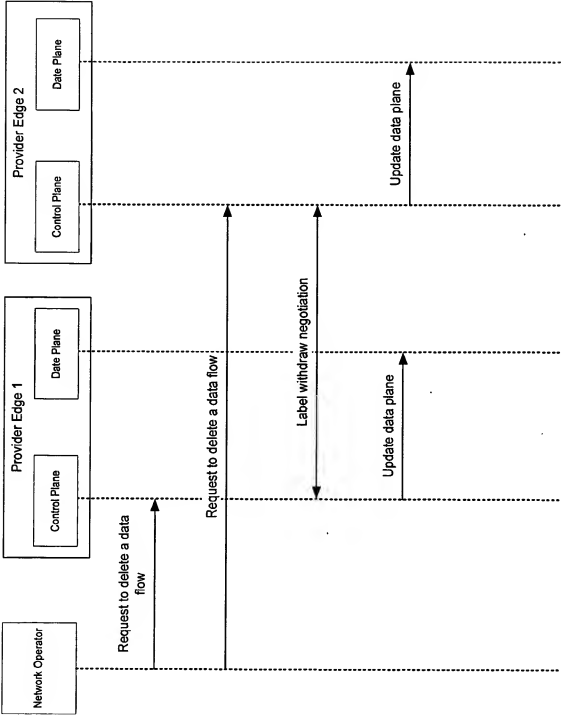


Figure 18

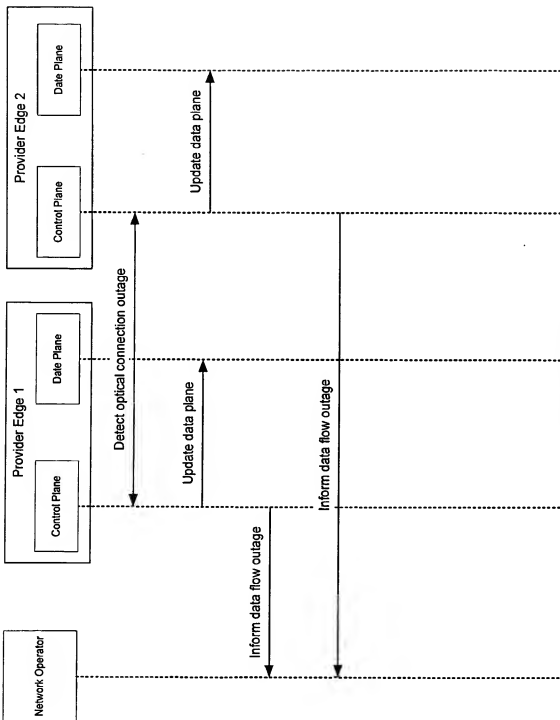


Figure 19

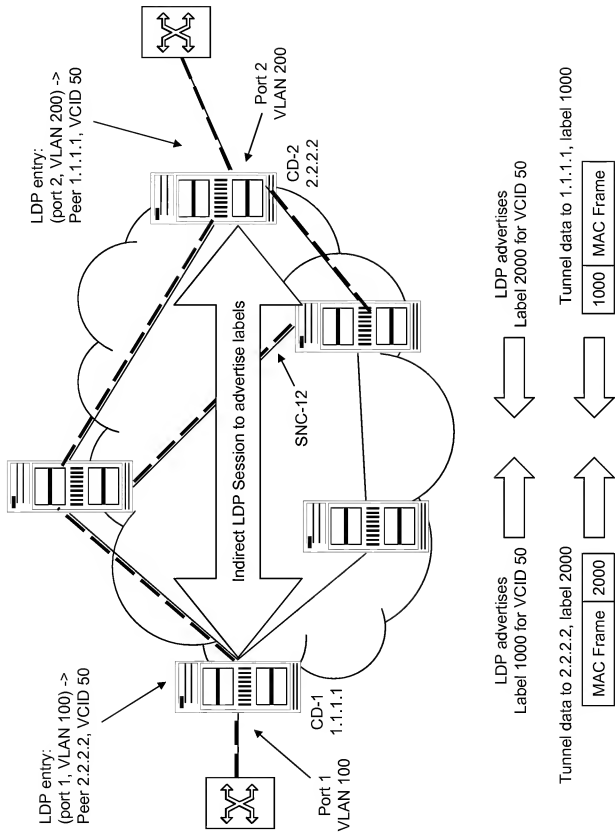


Figure 20

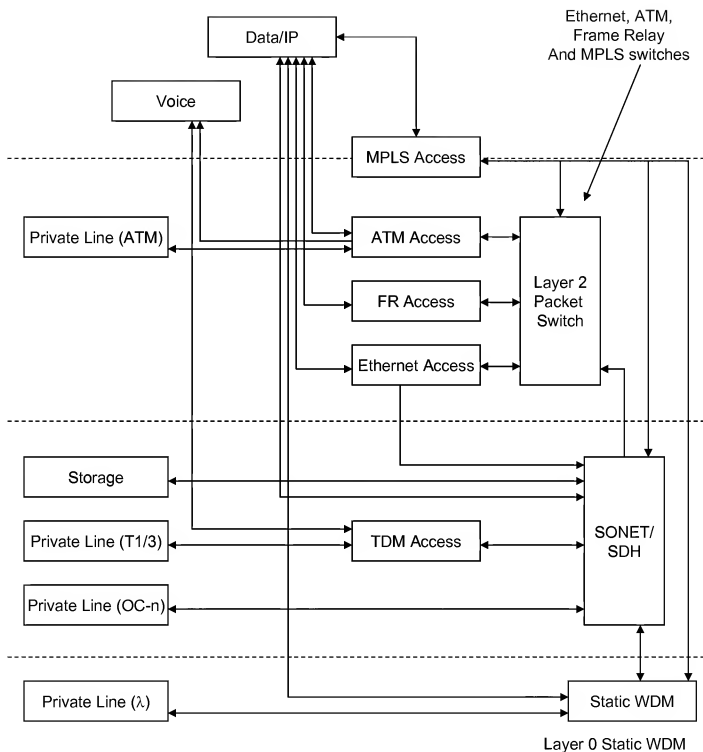


Figure 21
(Conventional)

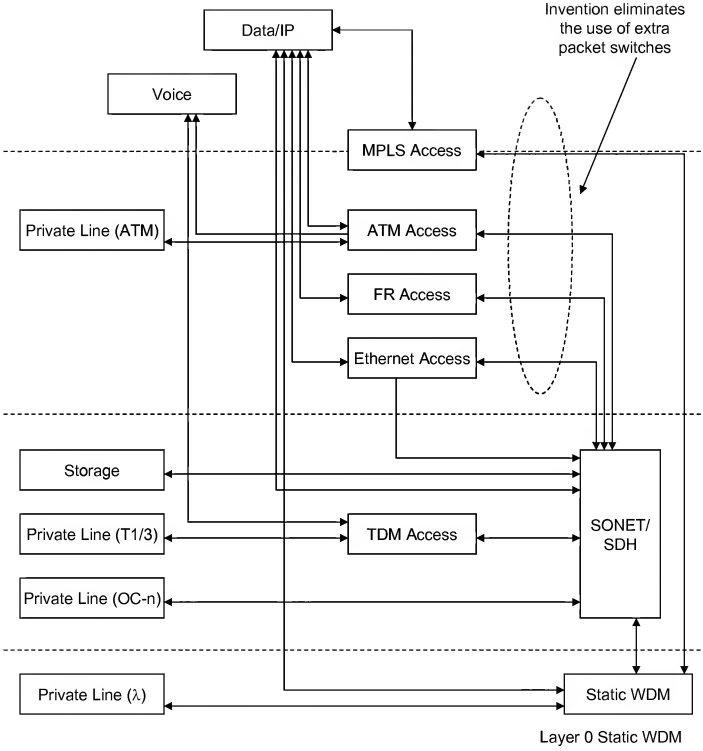


Figure 22

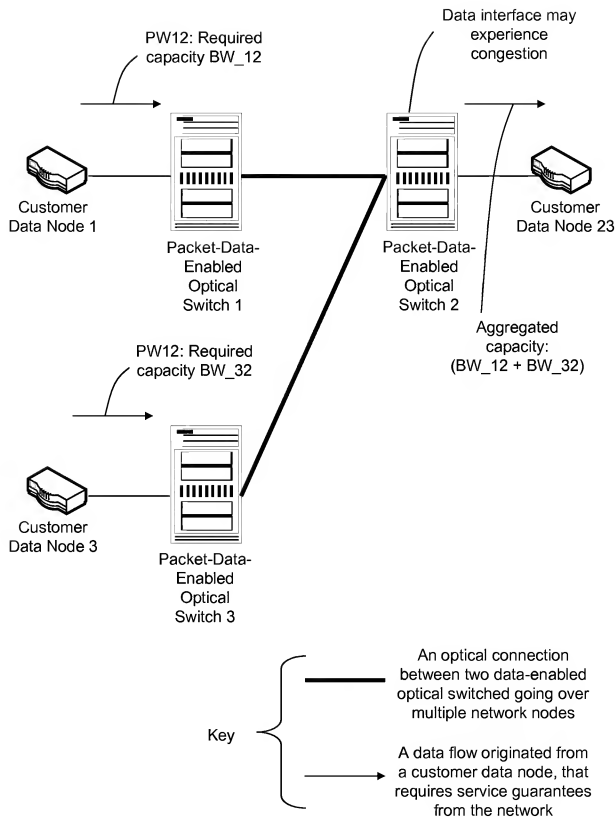
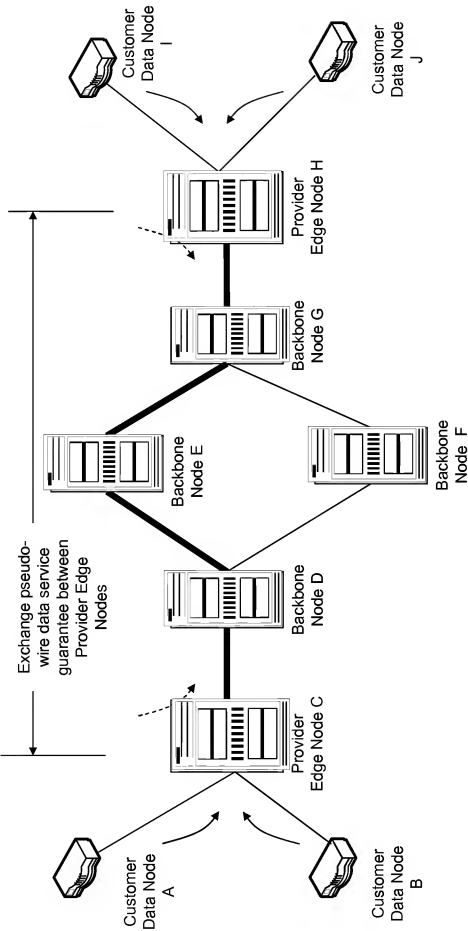


Figure 23a



- A data tunnel interconnected two provider edge nodes within a provider's backbone
- A data flow originating from a customer data node
- Control message flow originated from a provider edge node

Figure 23b

Key

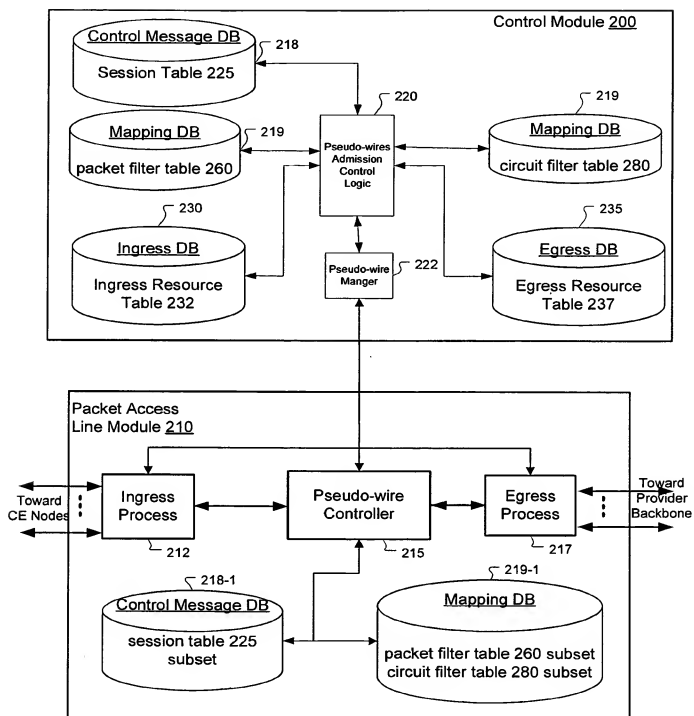


Figure 24

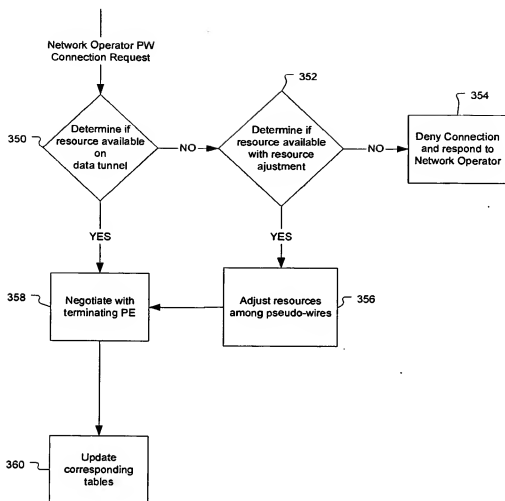


Figure 25a

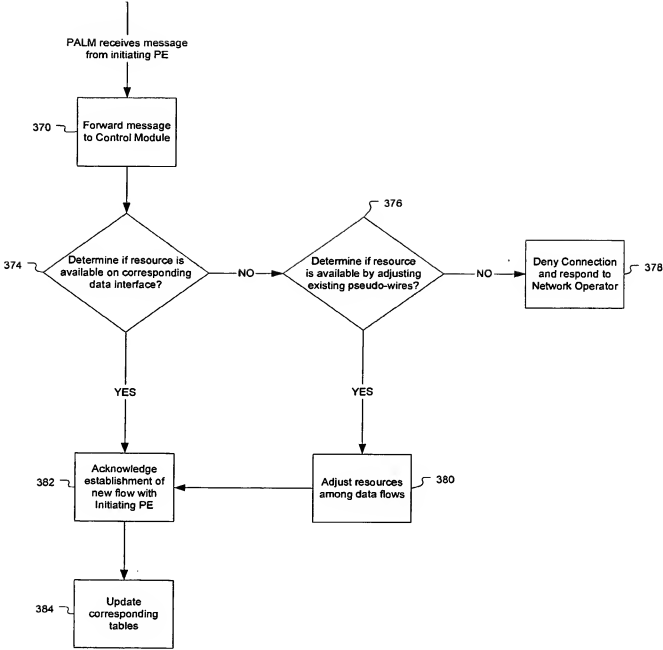


Figure 25b

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PACKET FILTER TABLE						
PACKET FILTER (DATA INTERFACE, LABEL)	DATA TUNNEL	ENCAPSULATION LABEL	CIR	CLASS	SETUP PRIORITY	HOLDING PRIORITY
PACKET FILTER-1 (PORT 1, ETHERNET VLAN 100)	SONET VCG NUMBER 3	MPLS LABEL 10000	50 Mb/Sec	AF-1	3	5
PACKET FILTER-2 (PORT 5, ATM VC/VP 12/45)	ROUTER INTERFACE 5	MPLS LABEL 20000	8 Mb/Sec	EF	3	5
PACKET FILTER-3 (PORT 2, FR DLCI 900)	SONET VCG NUMBER 3	MPLS LABEL 500	10 Mb/Sec	AF-1	3	5
PACKET FILTER-4 (PORT 10)	ETHERNET INTERFACE 12	MPLS LABEL 50001	1 Gb/Sec	AF-3	5	5

Figure 26

CIRCUIT FILTER TABLE					
CIRCUIT FILTER (DATA TUNNEL, LABEL)	OUTGOING DATA INTERFACE	CIR	CLASS	SETUP PRIORITY	HOLDING PRIORITY
CIRCUIT FILTER-1 (SONET VCG 3, LABEL 20000)	DATA PORT 1	50 Mb/Sec	AF-1	3	3
CIRCUIT FILTER-2 (SONET VCG 3, LABEL 20001)	DATA PORT 2	8 Mb/Sec	EF	3	3
CIRCUIT FILTER-3 (OPTICAL INTERFACE 1, LABEL 300)	DATA PORT 10	10 Gb/Sec	AF-3	3	3
CIRCUIT FILTER-4 (SONET VCG 5, LABEL 12000)	DATA PORT 1	100 Mb/Sec	AF-1	1	1
CIRCUIT FILTER-5 (SONET VCG 3, LABEL 3)	DATA PORT 2	1 Gb/Sec	AF-1	5	5

Figure 27

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SESSION TABLE				
SESSION (CONTROL MESSAGE ID)	OUTGOING DATA TUNNEL	ENCAPSULATION LABEL	CIR	CLASS
SESSION 1 (TCP SRC PORT 1345)	SONET VCG NUMBER 3	MPLS LABEL 3	1 Mb/Sec	EF
SESSION 2 (TCP SRC PORT 3456)	MPLS LSP 8	MPLS LABEL 3	2 Mb/Sec	EF
SESSION 3 (TCP SRC PORT 1998)	OPTICAL INTERFACE 1	MPLS LABEL 10000	N/A	EF

Figure 28

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INGRESS RESOURCE TABLE					
DATA TUNNEL	PHYSICAL BANDWIDTH	AVAILABLE TOTAL BANDWIDTH	AVAILABLE BANDWIDTH CLASS 1	AVAILABLE BANDWIDTH CLASS ...	AVAILABLE BANDWIDTH CLASS N
MPLS LSP with label 45	80 Mb/Sec	70 Mb/Sec	20 Mb/Sec	...	30 Mb/Sec
SONET VCG 4	100 Mb/Sec	50 Mb/Sec	50 Mb/Sec	...	0
DEDICATED POS CONNECTION	45 Mb/Sec	12 Mb/Sec	1.5 Mb/Sec	...	3.0 Mb/Sec

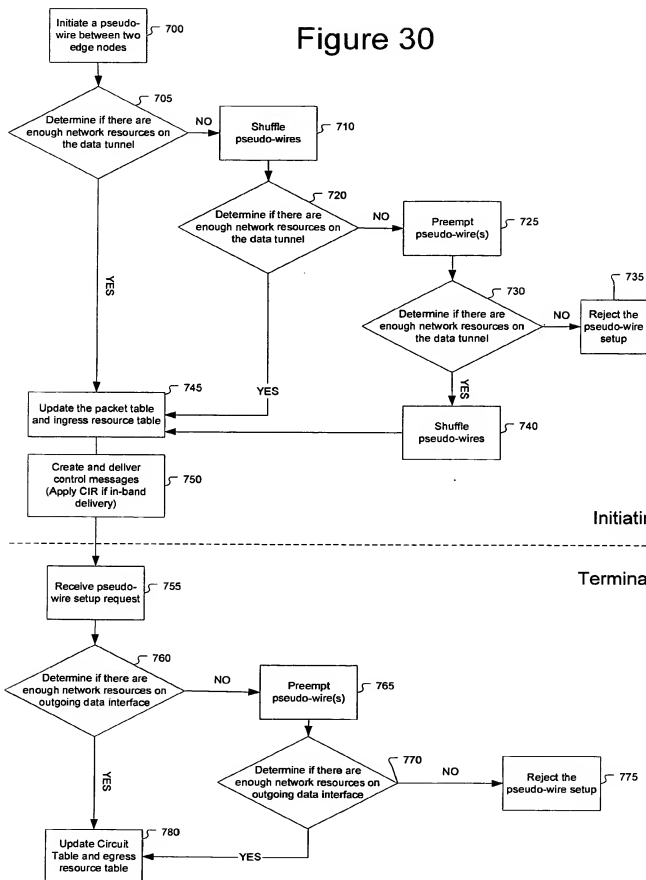
Figure 29a

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EGRESS RESOURCE TABLE					
DATA INTERFACE	PHYSICAL BANDWIDTH	AVAILABLE TOTAL BANDWIDTH	AVAILABLE BANDWIDTH CLASS 1	AVAILABLE BANDWIDTH CLASS ...	AVAILABLE BANDWIDTH CLASS N
ATM Interface	150 Mb/Sec	70 Mb/Sec	20 Mb/Sec	...	30 Mb/Sec
Ethernet Interface	100 Mb/Sec	50 Mb/Sec	50 Mb/Sec	...	0
DS3 Interface	45 Mb/Sec	12 Mb/Sec	1.5 Mb/Sec	...	3.0 Mb/Sec

Figure 29b

Figure 30



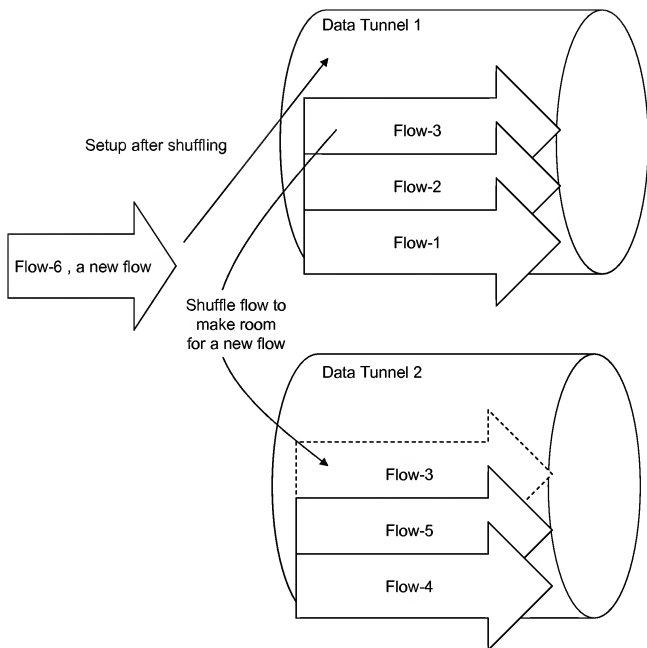


Figure 31

Figure 32

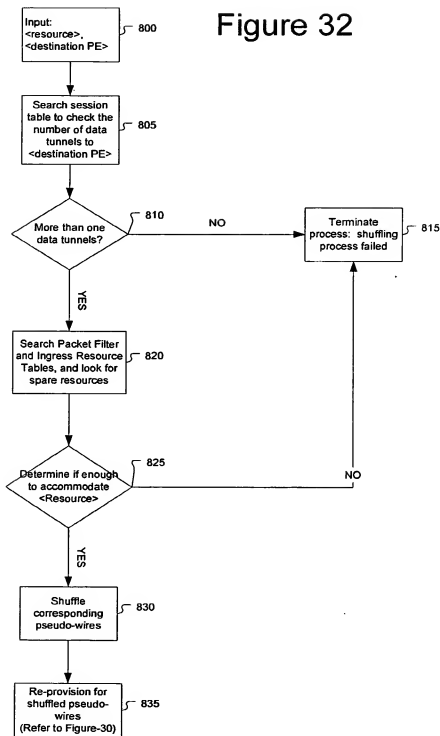
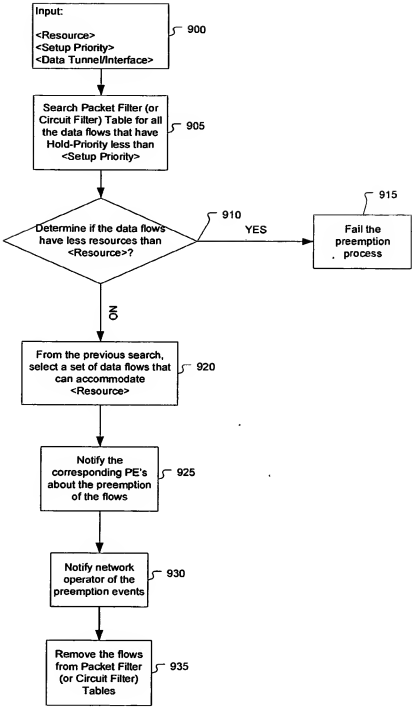


Figure 33



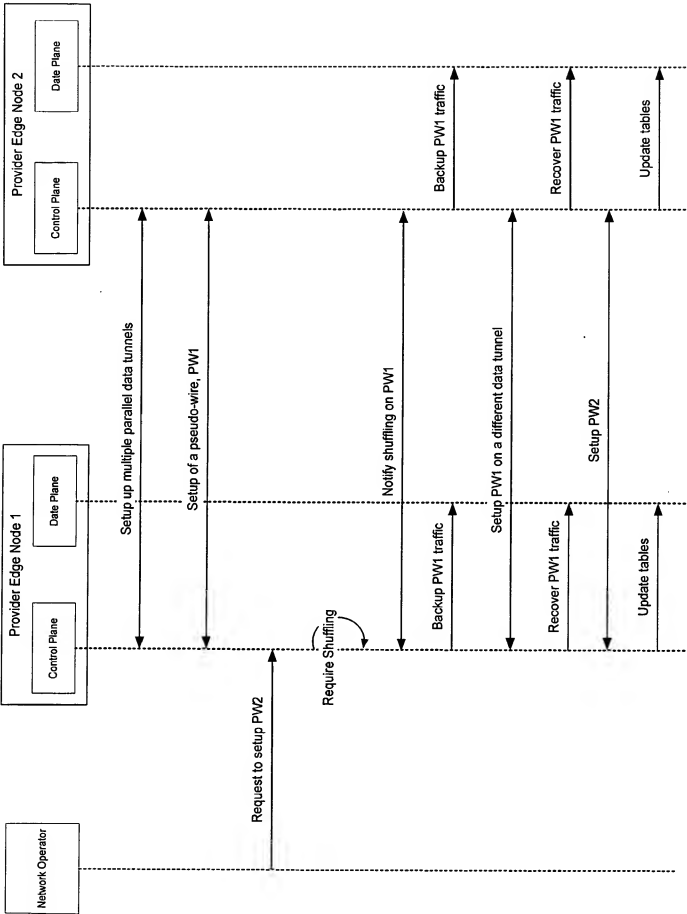


Figure 34

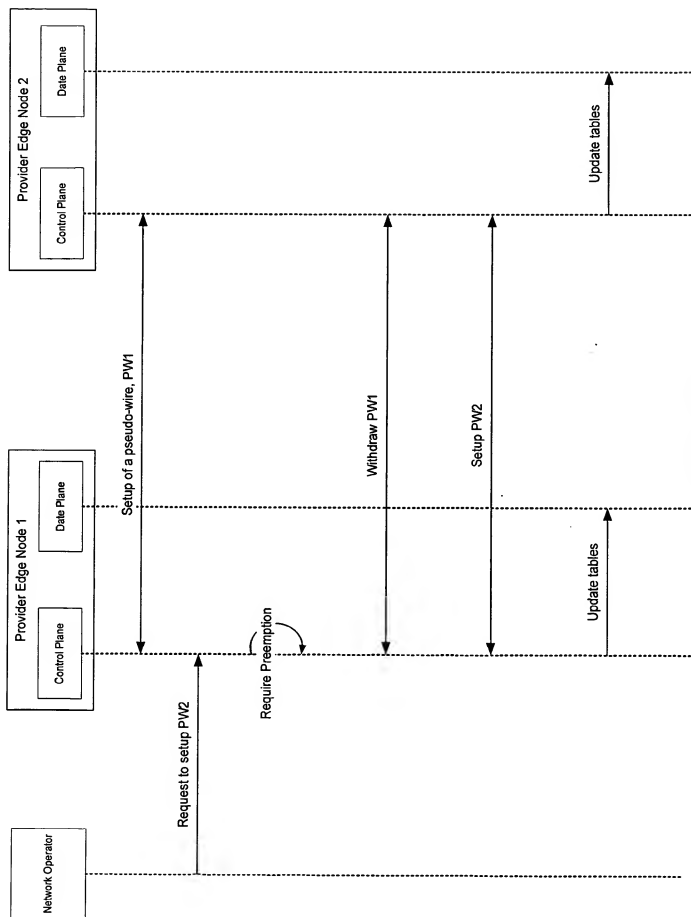


Figure 35

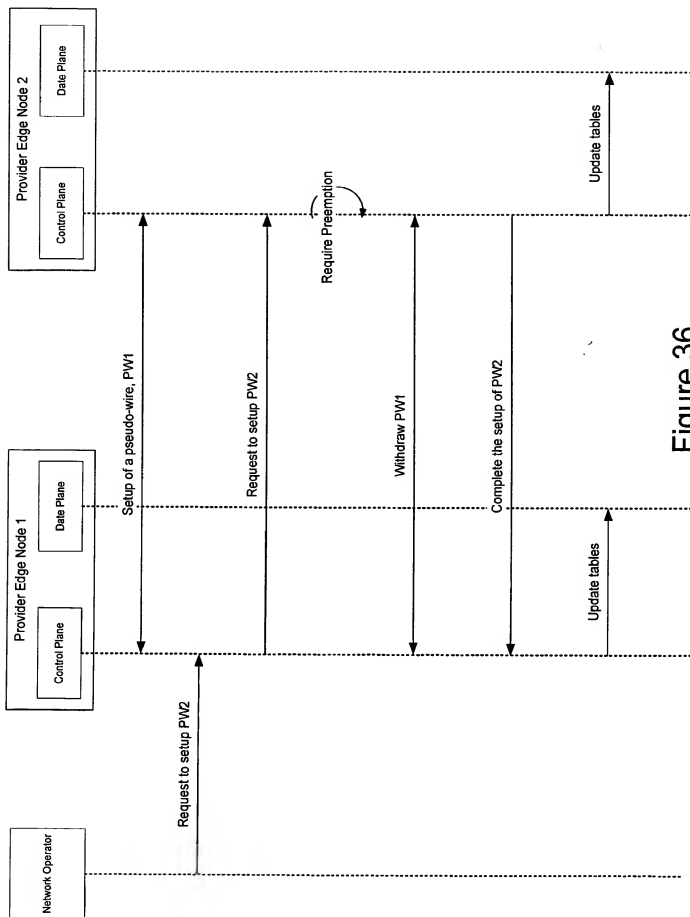


Figure 36